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Jameco Part Number 197915

PCI-COM422/485 Series

User's Manual

ComputerBoards, Inc.

Revision 1, January, 2000

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1. INTRODUCTION

The PCI-COM422/485 family consists of one and two port, RS-422 and RS-485-compatible, serial I/O boards designed to operate in computers with PCI bus accessory slots. The package includes complete software drivers for Windows 95, 98 and NT that allow the boards to be installed as a standard "COM" port in your computer.

The boards are fully plug-and-play and provide an independent UART for each port. An easy to use set up application program allows the user to choose between RS-422 and RS-485 operation as well as to enable the automatic transmitter enable mode in RS-485. The boards provide a maximum baud rate of 460.8 kbaud. All connections on the boards are made through DB9F connectors.

The available models are shown in the table below.

Board	**Number of Ports**	**On-Board Surge Suppression**	**FIFO Depth**
PCI-COM422/485	1	No	16 bytes
PCI-COM422/485/S	1	Yes	16 bytes
PCI-COM422/485/2	2	No	16 bytes
PCI-COM422/485/2/S	2	Yes	16 bytes

2. INSTALLATION

2.1 SOFTWARE INSTALLATION

Insert the PCI-COM CD into your CD drive. If your systems auto-run feature is enabled the PCI-COM installation wizard will automatically launch.

If the installation wizard does not auto-launch, you can initiate the software installation by running the program SETUP.EXE on the CD. Do this by locating the CD's SETUP.EXE file in your Windows Explorer and double clicking on it. Assuming your CD drive is the E: drive, SETUP.EXE will be in E:\

Follow the wizard's instructions and accept the default settings if possible. An option is provided during installation to copy an application that will restore the user settings after a reboot. This option should be installed if the board will be operated in a mode other than the factory default configuration shown below.

2.2 FACTORY DEFAULT PORT CONFIGURATION:

Mode	RS485
Transmit Control	Auto Enabled
Max Baud Rate	115.2K

If the PCI-COM422/485 board will be operated at either a higher baud rate or in RS422 mode then the configuration settings should be restored after reboot. This will prevent the end user from having to manually reconfigure the hardware after each reboot (Figure 2-1).

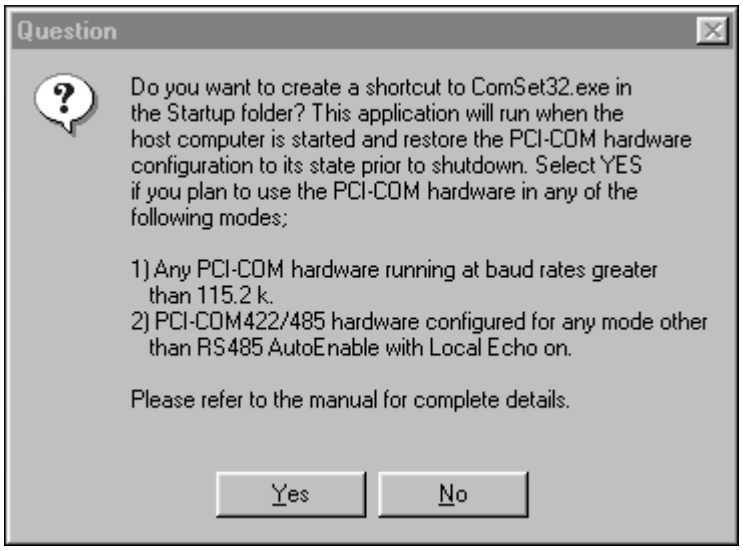
Question
Do you want to create a shortcut to ComSet32.exe in the Startup folder? This application will run when the host computer is started and restore the PCI-COM hardware configuration to its state prior to shutdown. Select YES if you plan to use the PCI-COM hardware in any of the following modes;
1) Any PCI-COM hardware running at baud rates greater than 115.2 k.
2) PCI-COM422/485 hardware configured for any mode other than RS485 AutoEnable with Local Echo on.
Please refer to the manual for complete details.
Yes
No

Figure 2-1. Installation Option

Selecting yes to the above option during installation will cause the board settings to be stored in the registry. When the computer is started the ComSet32.exe application will execute and restore the PCI-COM422/485 hardware settings to their pre-shutdown state.

2.3 HARDWARE INSTALLATION

The PCI-COM422/485 boards are plug-and-play configured by the host operating system. There are no switches for setting the base address or interrupt level. Configuration is controlled by your systems' BIOS. To install the board, turn off your PC, unplug it, open it, and insert your PCI-COM422/485 board into any available PCI slot.

To check that all ports have been properly installed you can interrogate the COM port system with the following sequence:

If you are using Windows 95 or 98:

1. Right click on the *"My Computer"* Icon on your desktop.
2. Click on *"Properties"*.
3. Click on the *"Device Manager"* tab.
4. Double click on the *"Ports (COM & LPT)"* Icon

If you are using Windows NT:

1. Right click *Start* and then *Settings* on the Task Bar.
2. Click on *"Control Panel"*.
3. Click on the *"Ports"* icon.

The new PCI-COM ports should be listed.

2.4 SET UP THE COM PORT PARAMETERS

2.4.1 IF YOU ARE USING WINDOWS 95 OR 98:

To set the RS422/485 port parameters (e.g. baud rate, parity) follow the sequence listed above and then double click on the port you wish to configure. The Communications Port (COM#) Properties sheet will appear. Click on the *"Port Settings"* tab and change the port settings to match your applications requirements. Click on the "Advanced" tab to select between RS422 and RS485 mode and to set the maximum baud rate clock. Figure 2-2 below shows the Advanced setting screen for Windows 95/98.

When "Enable RS422 Mode" is selected, the RS485 mode settings are ignored. The settings from this page are saved in the system registry to support automatic reconfiguration after reboot.

2.4.2 IF YOU ARE USING WINDOWS NT:

To set the RS422/485 port parameters (e.g. standard baud rates, parity) use the *Ports* applet that can be found in the Control Panel. Select the port you wish to configure and change the port settings to match your applications requirements. To configure the RS422/485 mode settings and to change the maximum baud rate execute the control panel applet *PCIcom*. Figure 2-3 below shows the configuration screen that is displayed. The application supports the selection of RS422 or RS485 mode as well as maximum baud rate selection.

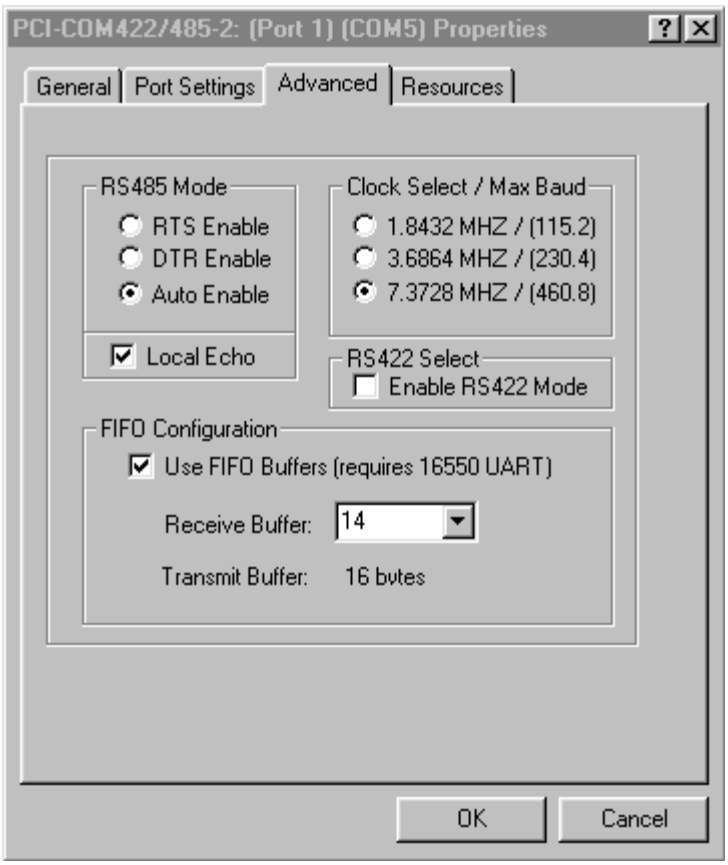

Figure 2-2. “Advanced” port settings tab for Windows 95/98.

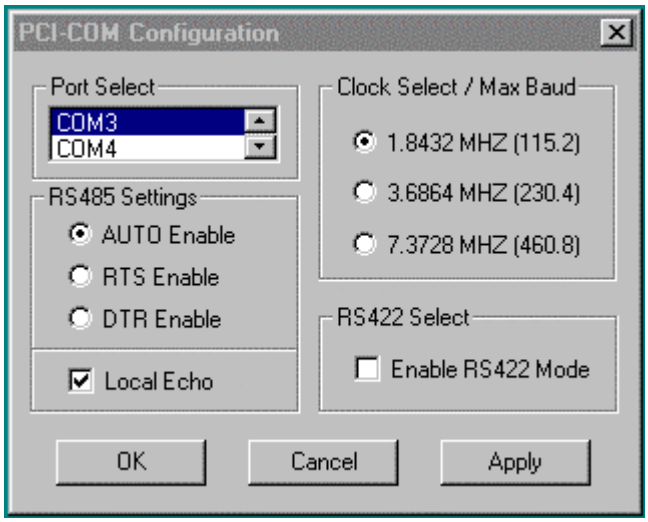

Figure 2-3. PCIcom Control Panel Applet for Windows NT.

2.4.3 TEST THE COM PORTS FOR PROPER OPERATION (COMAPP.EXE)

An application is provided that allows you to test your installation by communicating with another RS-422 or RS-485 serial port. This test application is called ComApp.exe, and was installed during your driver installation procedure. ComApp is a simple ASCII terminal emulator that automatically sends whatever you type on the keyboard over the selected COM port, and automatically displays the data the COM port receives.

You may use this application to test between two ports on the same PC, or install it on two PCs and test communication between them. If you are installing a multi-port board, or you have a free RS-422 or RS-485 port in addition to the one you are adding with the PCI–COM board, you can use the first method by running two instances of ComApp on the same PC.

If your COM port is connected to a simple ASCII controlled device, use ComApp to test for proper operation simply by typing one or more commands, and watching how the external device responds.

To launch ComApp.exe you may either find the file using your explorer and double-click on it or, starting with your Windows Start button, follow this order:

Start ➔ Programs ➔ ComputerBoards ➔ ComApp

Note: The above sequence assumes that the application was installed in the default "ComputerBoards" folder. If you selected a different folder during installation then replace "ComputerBoards" with your folder name.

If you have a multi-port board, you can make a quick port communication test by connecting one port to another, and sending/reading data between the two ports.

To do this test you will need to connect the two ports together. In RS422 mode the receive pair (Pins 6 and 7) must be connected to the transmit pair (Pins 8 and 9).

Port 1		Port 2
6	----------	8
7	----------	9
8	----------	6
9	----------	7

RS485 is a half-duplex protocol and thus transmits and receives over the same pair of wires. For RS485 the following connection will suffice to test the installation.

Port 1		Port 2
8	----------	8
9	----------	9

This serves to connect the transmit pins from one port to the receive pins of the other and vice versa. To perform the test, follow the instructions below:

1. Connect the two ports as indicated above

2. Launch the ComApp program (as described above)

3. Select the ***Settings*** menu block and configure the first port. Figure 2-4 shows the settings dialog that will be displayed.

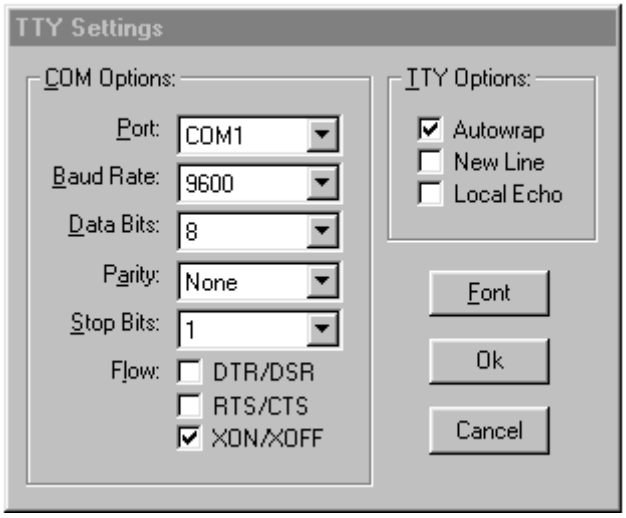

Figure 2-4. TTY Settings

4. Launch the ComApp again. You will get a second ComApp window. Go to the ***Settings*** menu and configure the second port. Note that you must use the same settings on both ports for this test to work properly.

5. On both open ComApp windows, go to the ***Action*** menu and select ***Connect.***

6. After connection, move the cursor to either ComApp window. Whatever is typed in that window should be immediately displayed in the other. You can also test port operations by selecting the ***Transfer*** menu and clicking on ***Send Data Block.*** A large block of ASCII characters will automatically be sent, and should appear on the other ComApp window. The transfer block can be used to send ASCII characters or hex numbers in user defined block sizes.

2.5 RS-485 AUTO-ENABLED MODE

The PCI-COM422/485 board incorporates a software selectable "Auto-Enable" mode. This mode can be used for applications that require reduced software overhead or to remove the burden of flow control from the application itself. The Auto-Enable mode can be used for the transmission of single characters or for block transfers of multiple characters in RS485 mode.

When using Auto-Enable mode, the PCI-COM485's on-board state machine enables the transmitter's output driver once the falling edge of a start bit is detected. The length of time the output driver is enabled is dependent on the combination of start, data, parity and stop bits the user selects.

Note: The user can select from any combination of start, data and parity bits, although this mode does limit the transmission to a single stop bit (1.5 and 2 stop bits are not allowed in this mode and if used will result in data integrity errors).

2.6 EXTENDED BAUD RATE OPERATION

Though it isn't possible to set baud rates greater than 115.2 kbaud on the PCI-COM series using the standard Windows *Communications Port Properties* dialog, the board and operating system are actually capable of operating at transfer rates up to 460.8 kbps. The PCI-COM series boards have a programmable divider between the on-board system clock and the UART. This divider can be set using the *Advanced* tab that was added to the Windows 95/98 *Communications Port Properties* dialog or the PCIcom applet added to the NT Control Panel during the PCI-COM software installation.

If the divider is set to divide by four, (the default setting) the board's baud rate is exactly as Windows sets it. If the divider is set to divide by two, the actual board baud rates become double what Windows has set them to. If the divider is set to divide by one, the board's baud rate is four times the baud rate set in Windows. These selections are summarized in the table below.

UART Clock Rate	Divider	Windows Setting	Actual baud rate
1.8432 MHz	4 (default)	115.2 kbps	115.2 kbps
3.6864 MHz	2	115.2 kbps	230.4 kbps
7.3728 MHz	1	115.2 kbps	460.8 kbps

Note: Please pay very careful attention to your baud rate selections when using the extended baud rate operating modes. The baud rate you select in windows will not be the actual baud rate setting of the PCI-COM board, and it is easy to get confused regarding the speed at which the system is actually running.

2.6.1 WINDOWS 95 OR 98 SPECIFIC CONFIGURATION

Extended baud rate operation is set on the COM port's property page. To change to the enhanced baud rate operating modes follow this procedure.

1. Right click on the *"My Computer"* Icon on your desktop.
2. Click on *"Properties"*.
3. Click on the *"Device Manager"* tab.
4. Double click on the *"Ports (COM & LPT)"* Icon.
5. Double click on the port you wish to configure.
6. Click on the "Advanced" tab.
7. Select the desired UART clock rate from the radio buttons as shown in Figure 2-5:

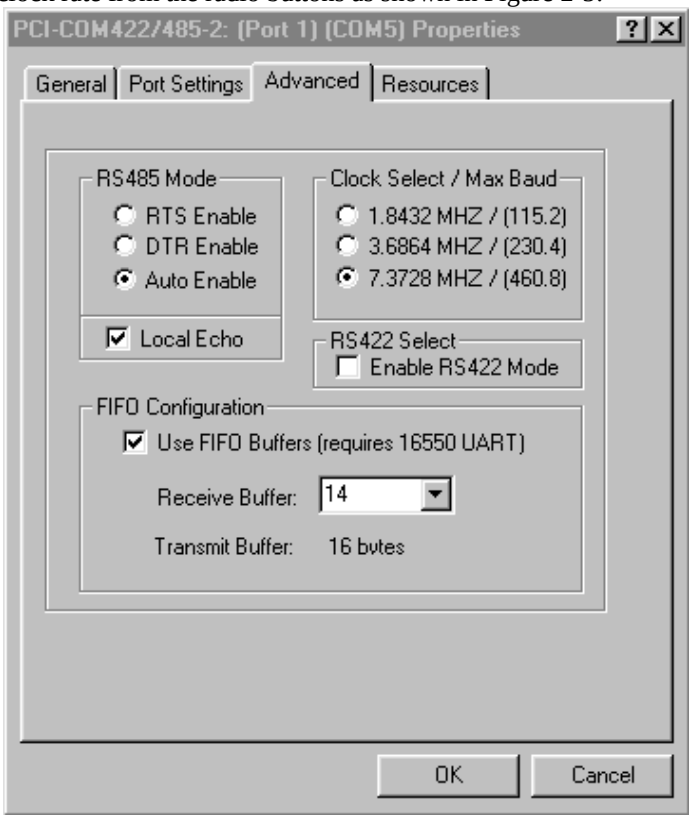

Figure 2-5. PCI-COM422/485 (Port1) (COM3) Properties Screen Display

2.6.2 WINDOWS NT SPECIFIC CONFIGURATION

Extended baud rate operation is set by the control panel applet *PCIcom*. To change to the enhanced baud rate operating modes, follow this procedure:

1. Right-click *Start*, then *Settings* on the Task Bar.
2. Click on *"Control Panel"*.
3. Click on the *"PCIcom"* icon.
4. Select the desired maximum clock rate from the dialog shown in Figure 2-6 below.

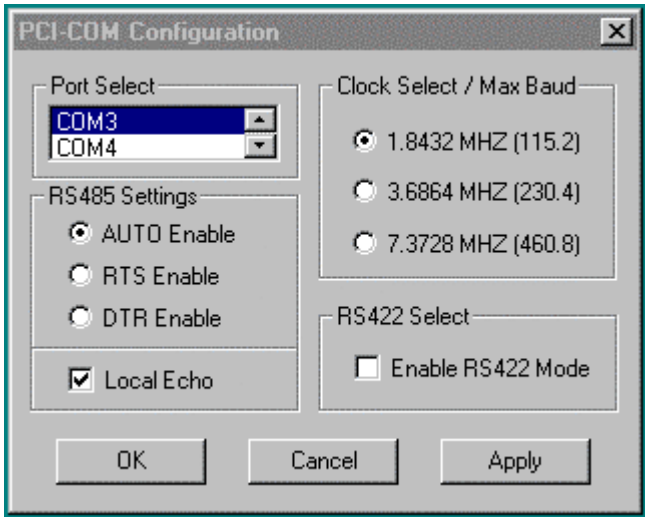

Figure 2-6. Windows NT PCIcom dialog

2.6.3 RESETTING CONFIGURATION ON POWER UP

The PCI-COM board will power up with the mode set to RS485 and UART Clock Rate set to 1.8432 MHz. If you change the UART Clock Rate or mode via the Device Manager Property Page, you must execute the *ComSet32.exe* application to restore the settings after a reboot. The Device Manager configuration dialog writes the chosen settings to the registry. The *ComSet32.exe* application reads the settings from the registry and restores the PCI-COM hardware configuration.

During installation, the user has the option to install a shortcut to the ComSet32.exe in the Startup folder. If you select this option, (see Figure 2-1) your PCI-COM422/485 hardware configuration is maintained across reboots. If you select NO, at each reboot the PCI-COM422/485 board is restored to its default configuration.

Note: The default settings for the hardware are RS485 mode with rates up to 115.2 kbaud.

If you selected NO during installation, when prompted about installing the *ComSet32.exe*, then you can manually create a shortcut and copy it to your Startup menu. The *ComSet32.exe* application is installed in the directory specified during installation. The default installation directory is C:\cb. To create a shortcut do the following:

1. Start the "Windows Explorer" application and open the installation directory.
2. Right click on the *"ComSet32.exe"* entry.
3. Select the *"Create Shortcut"* option from the drop down menu.
4. Under Windows 95/98: Copy the shortcut to the Startup folder (C:\Windows\Start Menu\Programs\Startup).

5. Under Windows NT: Copy the shortcut to the general Startup folder (C:\Windows\Profiles\All Users\Start Menu\Programs\Startup)

To keep the *ComSet32.exe* window from popping up during execution, set the shortcut to execute minimized. To set this option, do the following:

1. Right-click on the shortcut icon and select Properties.
2. Select the shortcut tab.
3. Set the option labeled Run to *"Minimized"*.

3. HARDWARE CONNECTIONS

The PCI-COM422/485 series provides 9-pin female “D” (DB9M) connectors that extend through the backplate of the board.

3.1 DB9F CONNECTIONS

The connectors on the PCI-COM422/485 boards provide the pin-out shown in Figure 3-1 below. The view shown is looking into the connector.

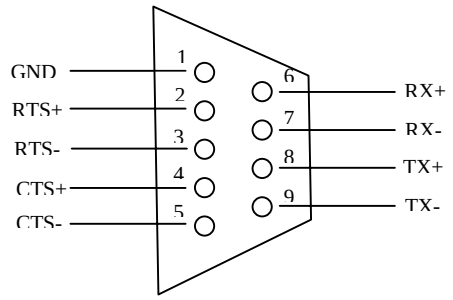

Figure 3-1. PCI-COM422/485 Connector Pinout

3.2 PORT IDENTIFICATION

The PCI-COM422/485/2 port identities are shown in Figure 3-2 below:

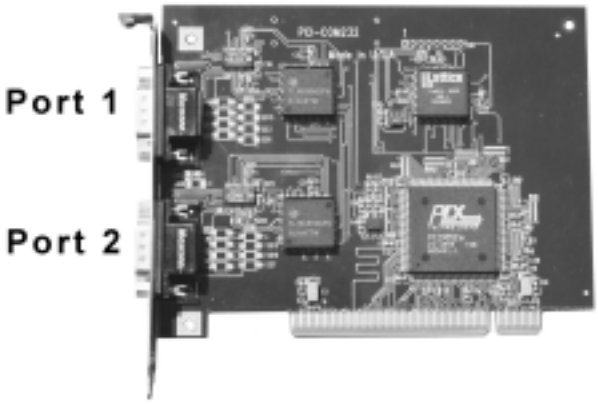

Figure 3-2. PCI-COM422/485 Board Port Locations

3.3 CHANGING THE COM PORT ASSIGNMENTS

In Windows 95/98, the PCI-COM ports is automatically installed, starting at COM5: (if available). Alternatively, the next available port is assigned if COM5 is not available. Other ports on multi-port boards are assigned in numeric sequence after the first port installed. If you wish to change the board’s initial COM Port number (e.g. from COM5: to COM3), please follow the procedure below. Additional ports on the board will also be changed so that the COM port assignments are sequential.

1. Right click on ***My Computer***.

2. Click on ***Properties.***
3. Click on the ***Device Manager*** tab.
4. Click on ***MultiFunction***.
5. Click on ***PCI-COM***.
6. Click on ***Resources***
7. Uncheck the ***Automatic Settings*** box.

Note the I/O ranges listings. There will be one more range listed than the number of ports provided on your board (e.g. the two port board will have three ranges listed). The first range +/-10 is a shared interrupt status register and should not be changed. Subsequent ranges are the actual COM port addresses.

Change the first port on your board to COM3: by following the procedure below:

1. Double click on the second I/O range listed. Highlight the complete listing.
2. Type; ***03e8-03ef*** and click ***OK***.
3. Windows will then notify you that you have made changes that may affect other devices.
4. Click ***OK.***

If installing a multi-port board, you will want to install the board's second port as COM4:. To do this:

1. Double click on the third I/O range.
2. Highlight the complete listing, then type ***02e8-02ef*** and click ***OK***.
3. Once again, windows will alert you that you have made modifications that may affect other devices.
4. Click ***OK***.

Your COM ports have now been moved to COM3: and COM4:. If you are installing the four port board, ports 3 and 4 now reside at COM5: and COM6: respectively.

This sequence is not required under Windows NT as the PCI-COM422/485 ports will be installed as the next available ports under NT. By default, a two-port PCI-COM422/485 board is installed as COM3: and COM4:.

3.4 STANDARD COM PORT CONFIGURATIONS

Table 3-1 lists the standard configurations for PC serial ports. Typically, COM1 and COM2 are assigned to the on-board serial ports.

Table 3-1. PC Serial Port Standard Configurations

Port Name	Address Range	Interrupt
COM1	0x3F8 – 0x3FF	4
COM2	0x2F8 – 0x2FF	3
COM3	0x3E8 – 0x3EF	4
COM4	0x2E8 – 0x2EF	3

3.5 TERMINATION JUMPER SETTINGS

The PCI-COM422/485 board contains several jumpers that can be used to terminate a network. Termination is used to match the impedance of the node with the impedance of the transmission line being used. The use of termination techniques is very application-specific and beyond the scope of this document. However, the PCI-COM422/485 does offer several termination configurations to help meet individual application requirements. Termination resistors (120 Ohm) can be applied by moving the respective jumper from the DISABLE to the ENABLE position. (Information on RS422/485 termination can be found in the B&B Electronics "RS-422 and RS-485 Application Note", www.bb-elec.com.)

4. REGISTER MAP

Although most users will take advantage of the COM driver supplied with the PCI-COM422/485 boards, the following register map (Table 4-1) has information for users that may require it.

4.1 REGISTER MAP OVERVIEW

Table 4-1. Register Map

REGISTER	READ FUNCTION	WRITE FUNCTION	Operations
BADR1+4Ch	Interrupt Status	Interrupt Control	32-bitDWORD
BADR2 + 0	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 1	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 2	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 3	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 4	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 5	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 6	Port 1 UART	Port 1 UART	8-bit BYTE
BADR2 + 7	Port 1 Clock Sel Register	Interrupt Status Register	8-bit BYTE
BADR3 + 0	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 1	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 2	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 3	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 4	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 5	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 6	Port 2 UART	Port 2 UART	8-bit BYTE
BADR3 + 7	Port 2 Clock Sel Register	Interrupt Status Register	8-bit BYTE

The single port PCI-COM422/485 board uses only Address range 1 and 2. The PCI-COM422/485/2 uses Address range 1, 2 and 3.

4.2 REGISTER DESCRIPTIONS

4.2.1 INTERRUPT STATUS/CONTROL

BADR1 + 4C hex

This register, and all 9052 registers, is 32 bits long. Since the remainder of the register has specific control functions, they would need to be masked off in order to access the interrupt control functions:

INTE is the Interrupt Enable:
0 = disabled, 1 = enabled (default).
INTPOL is the Interrupt Polarity:
0 = active low (default), 1 = active high.
INT is the Interrupt Status:
0 = interrupt is not active, 1 = interrupt is active.

READ/WRITE

31:8	7	6	5	4	3	2	1	0
x	x	x	x	X	x	INT	INTPOL	INTE

The UART ports are 16C550 compatible. See any 16C550 data sheet for register functions.

AVAILABLE PORTS:
PCI-COM422/485: PORT 1
PCI-COM422/485-2: PORTS 1-2

4.2.2 PORT 1 CLOCK SELECT / INTERRUPT STATUS

BADR2 + 07 hex

READ

7	6	5	4	3	2	1	0
PORT1 TXSEL1	PORT1 TXSEL0	PORT1 CKSEL1	PORT1 CKSEL0	-	-	INT2	INT1

WRITE

7	6	5	4	3	2	1	0
PORT1 TXSEL1	PORT1 TXSEL0	PORT1 CKSEL1	PORT1 CKSEL0	PORT1 ECHOEN	-	-	-

INTx Interrupt status for each port. The same signals are connected to this read register for all ports.

CKSEL1:0 UART clock select. This allows for data rates to 460.8 Kbps and different data rates on each port. These settings are per port:

CKSEL1	CKSEL0	UART CLOCK	Max Data Rate
0	0	1.8432 MHz	115.2 kbps
0	1	3.6864 MHz	230.4 kbps
1	0	7.3728 MHz	460.8 kbps

TXSEL1:0 Transmit data control select. This allows for controlling the Transmit Data driver. The default mode for RS485 is 'Auto Enable'. This mode is recommended for all RS485 communication.

TXSEL1	TXSEL0	Transmit Control	Duplex Mode
0	0	Auto Enable	Half
0	1	RTS Enable	Half
1	0	DTR Enable	Half
1	1	Transmit 'ON'	Full – RS422 Mode

ECHOEN 1:0 Echo enable/disable. When set low, this enables the hardware to echo the transmitted data to the receiver. When set high, this disables the 'Receiver Enable' control signal on the RS485 transceiver while data is being transmitted. Therefore, the transmitted data are not echoed to the receiver.
For TXSEL0:1 = '11', ECHOEN has no function since this is full duplex mode and the transmitter and receiver are always 'ON'.

4.2.3 PORT 2 CLOCK SELECT / INTERRUPT STATUS

BADR3 + 07 hex

READ

7	6	5	4	3	2	1	0
PORT2 TXSEL1	PORT2 TXSEL0	PORT2 CKSEL1	PORT2 CKSEL0	-	-	INT2	INT1

WRITE

7	6	5	4	3	2	1	0
PORT2 TXSEL1	PORT2 TXSEL0	PORT2 CKSEL1	PORT2 CKSEL0	PORT2 ECHOEN	-	-	-

INTx Interrupt status for each port. The same signals are connected to this read register for all ports.

CKSEL1:0 UART clock select. This allows for data rates to 460.8 Kbps and different data rates on each port. These settings are per-port:

CKSEL1	CKSEL0	UART CLOCK	Max Data Rate
0	0	1.8432 MHz	115.2 kbps
0	1	3.6864 MHz	230.4 kbps
1	0	7.3728 MHz	460.8 kbps

TXSEL1:0 Transmit data control select. This allows for controlling the Transmit Data driver. The default mode for RS485 is 'Auto Enable'. This mode is recommended for all RS485 communication.

TXSEL1	TXSEL0	Transmit Control	Duplex Mode
0	0	Auto Enable	Half
0	1	RTS Enable	Half
1	0	DTR Enable	Half
1	1	Transmit 'ON'	Full – RS422 Mode

ECHOEN 1:0 Echo enable/disable. When set low, this enables the hardware to echo the transmitted data to the receiver. When set high, this disables the 'Receiver Enable' control signal on the RS485 transceiver while data is being transmitted. Therefore, the transmitted data are not echoed to the receiver.
For TXSEL0:1 = '11', ECHOEN has no function since this is full duplex mode and the transmitter and receiver are always 'ON'.

5. SPECIFICATIONS

Typical for 25°C unless otherwise specified.

POWER CONSUMPTION

+5V	
PCI-COM422/485	240mA typ.
PCI-COM422/485-2	250mA typ.

COMMUNICATIONS SECTION

Number of Ports	
PCI-COM422/485	1
PCI-COM422/485-2	2
Port Type	RS422 or RS485 (software selectable)
UART	16C550
Data Rate	Up to 460 kbaud, software selectable
Miscellaneous	RS485 mode is software programmable for RTS Enable, DTS Enable or Automatic Enable DB9F female 9-pin D connector

INPUT/OUTPUT SECTION

Data Transceiver type	SP491
Data Rate	5Mbps min.

Data Transceiver Output Characteristics

Vol	0.4V max. (Iout= +4mA)
Voh	3.5V min. (Iout= -4.0mA)
Differential Output Voltage	GND to Vcc (unloaded)
Short Circuit Current	±250mA
Propagation Delay	30ns typ. (tplh/tphl)
Driver Enable to Output High	40ns typ.
Driver Enable to Output Low	40ns typ.
Driver Disable Time to Low	40ns typ.
Driver Disable Time to High	40ns typ.

Data Transceiver Input Characteristics

Vil	0.8V max.
Vih	2.0V min.
Maximum Input Voltage	±14V
Differential Threshold Voltage	±0.2V
Input Current	1mA (Vin = 12V) -0.8mA (Vin=-7V)
Propagation Delay	90ns typ. (tplh/tphl)
Receiver Enable to Output Low	20ns typ.
Receiver Enable to Output High	20ns typ.
Receiver Disable from Low	20ns typ.
Receiver Disable from High	20ns typ.

RTS/CTS Transceiver type	SP490
Data Rate	5Mbps min.
RTS/CTS Transceiver Input Characteristics	
	Input Voltage ±14V max. Data Rate 5Mbps min. Differential Threshold Voltage ±0.2V Input Current 1mA (Vin = 12V) -0.8mA (Vin=-7V) Propagation Delay 90ns typ. (tplh/tphl)
RTS/CTS Transceiver Output Characteristics	
	Differential Output Voltage GND to Vcc (unloaded) Short Circuit Current ±250mA Propagation Delay 30ns typ. (tplh/tphl)
Miscellaneous	All inputs supplied with 120 ohm jumper selectable termination, data pull-up and data pull-down resistors

TRANSIENT VOLTAGE SUPPRESION OPTION

Board Description
PCI-COM422/485/S
PCI-COM422/485-2/S

Data Transceiver Input	SP491 Input Voltage Range (derated) ±12V
RTS/CTS Transceiver Input	SP490 Input Voltage Range (derated) ±12V
TVS type	SMAJ12A
Working Voltage	±12V
Breakdown Voltage	13.3V min.
14.7V max.	
Peak Pulse Surge Current	15.1A max. (avalanche duration time =10µs)
Peak Pulse Power Dissipation	300W max. (avalanche duration time =10µs) Peak Pulse Power Dissipation is proportional to the amount of time the TVS remains in the avalanche mode. For specific power vs. avalanche duration information, consult the SMAJ12A datasheet.

ENVIRONMENTAL

Operating temperature range	0 to 70°C
Storage temperature range	-40 to 100°C
Humidity	0 to 90% non-condensing

6. TROUBLESHOOTING Q/A:

1) *The system was working before I rebooted and now no longer works.*
   The main issue with detecting the PCI-COM hardware involves the system-assigned base address. The PCI-COM board relies on the Plug-and-Play capabilities of the system BIOS to assign the base address for the COM ports. When new hardware is added to the machine, the entire system is reconfigured. This might affect the addresses assigned to the PCI-COM board and hence where the system detects the board. The easiest way to deal with this issue is to go into the Device Manager and delete the "PCI-COM…" entry under the "Multi-Function" node and reboot the system. This will force the system to reconfigure the PCI-COM board. After the machine has rebooted, go back into the Ports entry under the Device Manager and configure the Advanced settings. This forces the system to write the new settings to the registry. If you installed the ComSet32.exe application in the Startup folder, the new configuration is restored after each reboot.

2) *I cannot configure an internal modem under Windows NT.*
   The PCI-COM installation replaces the standard Windows NT *Serial.sys* device driver with a modified driver that supports the PCI-COM family of boards. The modified driver will work for any of the boards in the PCI-COM family as well as the internal COM1 and COM2 ports. However, there is an issue with the system being able to detect internal modems. This appears to be a resource-related issue with the current implementation of the modified serial device driver. Until this issue is resolved, internal modems are not supported on machines with PCI-COM boards.

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EC Declaration of Conformity

We, ComputerBoards, Inc., declare under sole responsibility that the product:

PCI-COM422/485 series	RS-422/485 interface for the PCI bus
Part Number	Description

to which this declaration relates, meets the essential requirements, is in conformity with, and CE marking has been applied according to the relevant EC Directives listed below using the relevant section of the following EC standards and other informative documents:

EU EMC Directive 89/336/EEC: Essential requirements relating to electromagnetic compatibility.

EU 55022 Class B: Limits and methods of measurements of radio interference characteristics of information technology equipment.

EN 50082-1: EC generic immunity requirements.

IEC 801-2: Electrostatic discharge requirements for industrial process measurement and control equipment.

IEC 801-3: Radiated electromagnetic field requirements for industrial process measurements and control equipment.

IEC 801-4: Electrically fast transients for industrial process measurement and control equipment.

Carl Haapaoja, Director of Quality Assurance